IN THE CLAIMS:

Kindly amend claims 11, 20 and 24 as shown in the following listing of claims, which replaces all previous versions and listings of claims.

1. (previously presented) A quartz crystal resonator capable of vibrating in a flexural mode of an inverse phase, the quartz crystal resonator comprising: a quartz crystal tuning fork base; first and second quartz crystal tuning fork tines connected to the quartz crystal tuning fork base, each of the first and second quartz crystal tuning fork tines having a first main surface and a second main surface opposite the first main surface and a groove having a plurality of stepped portions formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and an electrode disposed in the groove formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a merit value M_1 of a fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a merit value M_2 of a second overtone mode of vibration thereof, the merit values M_1 and M_2 being defined by the ratios Q_1/r_1 and Q_2/r_2, respectively, where Q_1 and Q_2 represent a quality factor of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator and

r_1 and r_2 represent a capacitance ratio of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator; wherein a piezoelectric constant e_{12} of the quartz crystal tuning fork resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value.

2. (previously presented) A quartz crystal resonator according to claim 1; wherein a groove having a plurality of stepped portions is formed on each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and wherein an electrode is disposed in each of the grooves formed on each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a merit value M_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than 65 and a merit value M_2 of the second overtone mode of vibration of the quartz crystal tuning fork resonator is less than 30.

3. (previously presented) A quartz crystal resonator according to claim 1; wherein the groove formed on at least one of opposite main surfaces of each of the quartz crystal tuning fork tines comprises a through-hole.

4. (previously presented) A quartz crystal unit comprising: a quartz crystal tuning fork resonator capable of vibrating in a flexural mode of an inverse phase, the quartz crystal tuning fork resonator comprising a quartz crystal tuning fork base, first and second quartz crystal tuning fork tines connected to the quartz crystal tuning fork base and each having a first main surface and a second main surface opposite the first main surface, a groove having a plurality of stepped portions formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines, and an electrode disposed in the groove formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a merit value M_1 of a fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a merit value M_2 of a second overtone mode of vibration thereof, the merit values M_1 and M_2 being defined by the ratios Q_1/r_1 and Q_2/r_2, respectively, where Q_1 and Q_2 represent a quality factor of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator and r_1 and r_2 represent a capacitance ratio of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator; a case for housing the quartz crystal tuning fork resonator; and

a lid for covering an open end of the case; wherein a piezoelectric constant e_{12} of the quartz crystal tuning fork resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value.

5. (previously presented) A quartz crystal unit according to claim 4; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a width of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 0.03 mm to 0.12 mm; wherein a spaced-apart distance between the first and second quartz crystal tuning fork tines is within a range of 0.05 mm to 0.35 mm and greater than or equal to the width of at least one of the grooves; and wherein a length of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 40% to 80% of a length of each of the first and second quartz crystal tuning fork tines.

6. (previously presented) A quartz crystal unit according to claim 4; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal

tuning fork tines; and wherein an electrode is disposed in the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a capacitance ratio r_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is less than a capacitance ratio r_2 of the second overtone mode of vibration thereof.

7. (previously presented) A quartz crystal unit according to claim 4; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a width W_2 of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 0.03 mm to 0.12 mm; wherein the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines has an inner stepped portion and an outer stepped portion opposite to the inner stepped portion in the width direction of the corresponding one of the first and second quartz crystal tuning fork tines; wherein each of the first and second quartz crystal tuning fork tines has side surfaces comprising an inner side surface and an outer side surface opposite to the inner side surface, the inner stepped portion being opposite to the inner side surface, and the outer stepped portion being

opposite to the outer side surface; and further comprising a first electrode disposed on each of the inner and outer stepped portions of the groove formed in each of the first and second main surfaces of the first and second quartz crystal tuning fork tines and a second electrode disposed on each of the inner and outer side surfaces of the first and second quartz crystal tuning fork tines; wherein the first electrodes disposed on the inner and outer stepped portions of the grooves of the first quartz crystal tuning fork tine are connected to the second electrodes disposed on the inner and outer side surfaces of the second quartz crystal tuning fork tine so that the first electrodes of the first quartz crystal tuning fork tine and the second electrodes of the second quartz crystal tuning fork tine define a first electrode terminal; and wherein the second electrodes disposed on the inner and outer side surfaces of the first quartz crystal tuning fork tine are connected to the first electrodes disposed on the inner and outer stepped portions of the grooves of the second quartz crystal tuning fork tine so that the second electrodes of the first quartz crystal tuning fork tine and the first electrodes of the second quartz crystal tuning fork tine define a second electrode terminal.

8. (previously presented) A quartz crystal unit according to claim 4; wherein a spaced-apart distance between the first and second quartz crystal tuning fork tines is within a range of 0.05 mm to 0.35 mm; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that the spaced-apart distance between the first and second quartz crystal tuning fork tines is greater than or equal to a width of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines has a base portion; and wherein an electrode is disposed on the base portion of the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that the electrodes disposed on the base portions of the grooves of the first quartz crystal tuning fork tine have an electrical polarity opposite to an electrical polarity of the electrodes disposed on the base portions of the grooves of the second quartz crystal tuning fork tine.

9. (previously presented) A quartz crystal unit according to claim 4; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein the quartz crystal tuning fork base has a cut portion; and wherein a length of the quartz crystal tuning fork base is less than 0.5 mm.

10. (previously presented) A quartz crystal unit according to claim 4; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein stable factors S_1 and S_2 of the fundamental mode of vibration and the second overtone mode of vibration of the quartz crystal tuning fork resonator are defined by $S_1=r_1/2Q_1^2$ and $S_2=r_2/2Q_2^2$, respectively; and wherein an electrode is disposed on the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that S_1 is less than S_2.

11. (currently amended) A quartz crystal oscillator comprising: a quartz crystal oscillating circuit comprised of an amplification circuit comprising a CMOS inverter and a feedback resistor, and a feedback circuit comprising a quartz crystal tuning fork resonator capable of vibrating in a flexural mode of an inverse phase, a plurality of capacitors

and a drain resistor, the quartz crystal tuning fork resonator comprising a quartz crystal tuning fork base, first and <u>second</u> quartz crystal tuning fork tines connected to the quartz crystal tuning fork base and each having a first main surface and a second main surface opposite the first main surface, a groove having a plurality of stepped portions formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines, and an electrode being disposed in the groove formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a merit value M_1 of a fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a merit value M_2 of a second overtone mode of vibration thereof, the merit values M_1 and M_2 being defined by the ratios Q_1/r_1 and Q_2/r_2, respectively, where Q_1 and Q_2 represent a quality factor of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator and r_1 and r_2 represent a capacitance ratio of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator; wherein a piezoelectric constant e_{12} of the quartz crystal tuning fork resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value.

12. (previously presented) A quartz crystal oscillator according to claim 11; wherein at least one groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a ratio W_2/W is greater than 0.35 and less than 1, where W_2 represents a width of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines and W represents a width of each of the quartz crystal tuning fork tines; and wherein a length of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 40% to 80% of a length of each of the first and second quartz crystal tuning fork tines.

13. (previously presented) A quartz crystal oscillator according to claim 11; wherein a ratio of an amplification rate α_1 of the fundamental mode of vibration and an amplification rate α_2 of the second overtone mode of vibration of the amplification circuit is greater than that of a feedback rate β_2 of the second overtone mode of vibration and a feedback rate β_1 of the fundamental mode of vibration of the feedback circuit, and a product of the amplification rate α_1 and the feedback rate β_1 of the fundamental mode of vibration is greater than 1; wherein a groove having a

plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and wherein an electrode is disposed in the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a series resistance R_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is less than a series resistance R_2 of the second overtone mode of vibration thereof.

14. (previously presented) A quartz crystal oscillator according to claim 11; wherein a ratio of an absolute value of negative resistance $-RL_1$ of the fundamental mode of vibration of the amplification circuit and a series resistance R_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than that of an absolute value of negative resistance $-RL_2$ of the second overtone mode of vibration of the amplification circuit and a series resistance R_2 of the second overtone mode of vibration thereof; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and wherein an electrode is disposed in the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a capacitance ratio r_1 of the fundamental mode of

vibration of the quartz crystal tuning fork resonator is less than a capacitance ratio r_2 of the second overtone mode of vibration thereof.

15. (previously presented) A quartz crystal oscillator according to claim 11; wherein $|-RL_1|/R_1$ is greater than $2|-RL_2|/R_2 -1$, where $|-RL_1|$ and $|-RL_2|$ represent an absolute value of negative resistance of the fundamental mode of vibration and the second mode of vibration of the amplification circuit, and R_1 and R_2 represent a series resistance of the fundamental mode of vibration and the second overtone mode of vibration of the quartz crystal tuning fork resonator.

16. (previously presented) A quartz crystal oscillator according to claim 11; wherein a groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein an electrode is disposed in the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a capacitance ratio r_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is less than a capacitance ratio r_2 of the second overtone mode of vibration thereof; and wherein the quartz crystal oscillating circuit outputs through a buffer

circuit an output signal an oscillation frequency of about 32.768 kHz with a frequency deviation within the range of -100 PPM to +100 PPM.

17. (previously presented) In an electronic apparatus having a display portion: at least one quartz crystal oscillator comprising a quartz crystal oscillating circuit comprised of an amplification circuit having at least an amplifier, and a feedback circuit comprising at least a quartz crystal tuning fork resonator capable of vibrating in a flexural mode of an inverse phase, the quartz crystal tuning fork resonator comprising a quartz crystal tuning fork base, first and second quartz crystal tuning fork tines connected to the quartz crystal tuning fork base and each having a first main surface and a second main surface opposite the first main surface, a groove having a plurality of stepped portions formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines, and an electrode disposed in the groove formed in at least one of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a merit value M_1 of a fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a merit value M_2 of a second overtone mode of vibration thereof, the merit values M_1 and M_2 being defined by the ratios Q_1/r_1 and Q_2/r_2, respectively, where Q_1 and Q_2 represent a quality factor

of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator and r_1 and r_2 represent a capacitance ratio of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator; wherein a piezoelectric constant e_{12} of the quartz crystal tuning fork resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value.

18. (previously presented) An electronic apparatus according to claim 17; wherein at least one groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein each of the fundamental mode of vibration and the second overtone mode of vibration of the quartz crystal tuning fork resonator is driven by the piezoelectric constant e_{12} within the range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value; wherein $|-RL_1|/R_1$ is greater than $2|-RL_2|/R_2 -1$, where $|-RL_1|$ and $|-RL_2|$ represent an absolute value of negative resistance of the fundamental mode of vibration and the second overtone mode of vibration of the amplification circuit, and R_1 and R_2 represent a series resistance of the fundamental mode of vibration and the second overtone mode of vibration of the quartz crystal tuning fork resonator; and wherein an output signal of the quartz crystal oscillating circuit is a clock

signal for use in operation of the electronic apparatus to display time information at the display portion, the clock signal having an oscillation frequency of the fundamental mode of vibration.

19. (previously presented) An electronic apparatus according to claim 17; wherein at least one groove having a plurality of stepped portions is formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines has a central linear portion; wherein the at least one groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is formed in the central linear portion of each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a width of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is greater than a distance in the width direction of the at least one groove measured from an outer edge of the at least one groove to an outer edge of the corresponding one of the first and second quartz crystal tuning fork tines; wherein a length of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning

fork tines is within a range of 40% to 80% of a length of each of the first and second quartz crystal tuning fork tines; and wherein an output signal of the quartz crystal oscillating circuit is a clock signal for use in operation of the electronic apparatus to display time information at the display portion, the clock signal having an oscillation frequency of the fundamental mode of vibration.

20. (currently amended) An electronic apparatus according to claim 18; wherein the amplification circuit of the quartz crystal oscillating circuit has a CMOS inverter and a feedback ~~resistor~~ circuit, the feedback ~~resistor~~ circuit having the quartz crystal tuning fork resonator, a plurality of capacitors and a drain resistor, the quartz crystal tuning fork resonator being electrically connected to the amplification circuit and to the plurality of capacitors and the drain resistor of the feedback circuit; wherein the at least one quartz crystal oscillator comprises a quartz crystal oscillating circuit comprising a quartz crystal resonator, an amplifier, a plurality of resistors, and a plurality of capacitors, a mode of vibration of the quartz crystal resonator of the quartz crystal oscillating circuit being different from that of the quartz crystal tuning fork resonator; and wherein the quartz crystal resonator of the quartz crystal oscillating circuits comprises one of a length-extensional mode quartz crystal resonator, a thickness shear

mode quartz crystal resonator, a width-extensional mode quartz crystal resonator, a Lame mode quartz crystal resonator and a SAW resonator.

21. (previously presented) An electronic apparatus according to claim 17; wherein the at least one quartz crystal oscillator comprises a quartz crystal oscillating circuit comprised of an amplification circuit having an amplifier and a feedback resistor, and a feedback circuit comprising a quartz crystal resonator, a plurality of capacitors and a drain resistor, the quartz crystal resonator being a length-extensional mode quartz crystal resonator comprised of a vibrational portion having a length greater than a width and a thickness smaller than the width, connecting portions located at ends of the vibrational portion, supporting portions connected to the vibrational portion through the connecting portions, and electrodes disposed opposite each other on upper and lower faces of the vibrational portion; wherein a piezoelectric constant e_{12} of the length-extensional mode resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value; and wherein the quartz crystal oscillating circuit outputs a signal through a buffer circuit, the output signal being a clock signal for use in operation of the electronic apparatus.

22. - 23. (canceled).

24. (currently amended) A quartz crystal unit according to claim 4; wherein the quartz crystal tuning fork base has a cut portion; and wherein the quartz crystal tuning fork resonator has a frame portion protruding from ~~the cut portion of~~ the quartz crystal tuning fork base and mounted on a mounting portion of the case.

25. (previously presented) A method for manufacturing an electronic apparatus, comprising the steps of:

providing a display portion;

forming at least one quartz crystal tuning fork resonator capable of vibrating in a flexural mode of an inverse phase and having a fundamental mode of vibration, a second overtone mode of vibration, a quartz crystal tuning fork base, and first and second quartz crystal tuning fork tines connected to the quartz crystal tuning fork base and each having side surfaces;

disposing an electrode on each of two of the side surfaces of each of the first and second quartz crystal tuning fork tines so that the electrodes disposed on the side surfaces of the first quartz crystal tuning fork tine have an electrical polarity opposite to an electrical polarity of the electrodes disposed on the side surfaces of the second quartz crystal tuning fork tine;

providing at least one quartz crystal oscillator comprising a quartz crystal oscillating circuit comprised of an amplification circuit having a CMOS inverter and a feedback resistor, and a feedback circuit having the quartz crystal tuning fork resonator;

mounting the quartz crystal tuning fork resonator on a mounting portion of a case using a conductive adhesive or solder; and

adjusting an oscillation frequency of the quartz crystal tuning fork resonator so that the quartz crystal oscillating circuit outputs an output signal of the oscillation frequency of about 32.768 kHz with a frequency deviation within a range of -100 PPM to +100 PPM;

wherein a ratio of an absolute value of negative resistance $-RL_1$ of the fundamental mode of vibration of the amplification circuit and a series resistance R_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a ratio of an absolute value of negative resistance $-RL_2$ of the second overtone mode of vibration of the amplification circuit and a series resistance R_2 of the second overtone mode of vibration thereof;

wherein a merit value M_1 of the fundamental mode of vibration of the quartz crystal tuning fork resonator is greater than a merit value M_2 of the second overtone mode of vibration thereof, the merit values M_1 and M_2 being defined by

the ratios Q_1/r_1 and Q_2/r_2, respectively, where Q_1 and Q_2 represent a quality factor of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator and r_1 and r_2 represent a capacitance ratio of the fundamental mode of vibration and the second overtone mode of vibration, respectively, of the quartz crystal tuning fork resonator; and

wherein a piezoelectric constant e_{12} of the quartz crystal tuning fork resonator is within a range of 0.095 C/m^2 to 0.19 C/m^2 in the absolute value.

26. (previously presented) A method according to claim 25; wherein the forming step includes the steps of forming a plurality of the quartz crystal tuning fork resonators in a quartz crystal wafer, inspecting the quartz crystal wafer to identify any damaged quartz crystal tuning fork resonators, and either marking the damaged quartz crystal tuning fork resonators in the quartz crystal wafer, storing in a computer identification information corresponding to the damaged quartz crystal tuning fork resonators, or removing from the quartz crystal wafer the damaged quartz crystal tuning fork resonators.

27. (previously presented) A method according to claim 25; further comprising the step of electrically connecting the quartz crystal tuning fork resonator to the

amplification circuit; and wherein an output signal of the quartz crystal oscillating circuit comprises a clock signal for use in operation of the electronic apparatus to display time information at the display portion, the clock signal having an oscillation frequency of the fundamental mode of vibration of the quartz crystal tuning fork resonator.

28. (previously presented) A method according to claim 27; wherein the quartz crystal oscillating circuit comprises a quartz crystal resonator, an amplifier, a plurality of resistors, and a plurality of capacitors, the quartz crystal resonator comprising one of a length-extensional mode quartz crystal resonator, a thickness shear mode quartz crystal resonator, a width-extensional mode quartz crystal resonator, a Lame mode quartz crystal resonator, and a SAW resonator; wherein a mode of vibration of the quartz crystal resonator is different from that of the quartz crystal tuning fork resonator capable of vibrating in a flexural mode; and wherein an output signal of the quartz crystal oscillating circuit comprises a clock signal for use in operation of the electronic apparatus.

29. (previously presented) A method according to claim 25; wherein each of the first and second quartz crystal tuning fork tines has first and second opposite main surfaces and first and second opposite side surfaces; wherein the

forming step further comprises the step of forming a groove having a plurality of stepped portions in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; wherein the disposing step comprises the steps of disposing a first electrode on each of at least two of the stepped portions of the groove in each of the first and second main surfaces of the first and second quartz crystal tuning fork tines and a second electrode on each of the first and second side surfaces of each of the first and second quartz crystal tuning fork tines; and wherein an output signal of the quartz crystal oscillating circuit comprises a clock signal for use in operation of the electronic apparatus to display time information at the display portion, the clock signal having an oscillation frequency of the fundamental mode of vibration of the quartz crystal tuning fork resonator.

30. (previously presented) A method according to claim 29; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching process; and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process different from the first etching process, the step of forming the first and second quartz crystal tuning fork tines being performed before the step of

forming the at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and further comprising the steps of connecting the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the first quartz crystal tuning fork tine to the second electrodes disposed on the first and second side surfaces of the second quartz crystal tuning fork tine to form a first electrode terminal, and connecting the second electrodes disposed on the first and second side surfaces of the first quartz crystal tuning fork tine to the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the second quartz crystal tuning fork tine to form a second electrode terminal.

31. (previously presented) A method according to claim 29; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching process; and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process different from the first etching process, the step of forming the first and second quartz crystal tuning fork tines being performed after the step of forming the at least one of the grooves formed in the first

and second main surfaces of each of the first and second quartz crystal tuning fork tines; and further comprising the steps of connecting the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the first quartz crystal tuning fork tine to the second electrodes disposed on the first and second side surfaces of the second quartz crystal tuning fork tine to form a first electrode terminal, and connecting the second electrodes disposed on the first and second side surfaces of the first quartz crystal tuning fork tine to the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the second quartz crystal tuning fork tine to form a second electrode terminal.

32. (previously presented) A method according to claim 29; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching process so that a spaced-apart distance between the first and second quartz crystal tuning fork tines is within a range of 0.05 mm to 0.35 mm; and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process different from the first etching process so that a width W_2 of at least one of the grooves formed in the first and second main surfaces of

each of the first and second quartz crystal tuning fork tines is within a range of 0.03 mm to 0.12 mm and a ratio W_2/W is greater than 0.35 and less than 1, where W represents a width of each of the quartz crystal tuning fork tines, the spaced-apart distance between the first and second quartz crystal tuning fork tines being greater than or equal to the width W_2 of the at least one groove, and the step of forming the first and second quartz crystal tuning fork tines being performed before the step of forming the at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines.

33. (previously presented) A method according to claim 29; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching process so that a spaced-apart distance between the first and second quartz crystal tuning fork tines is within a range of 0.05 mm to 0.35 mm; and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process different from the first etching process so that a width W_2 of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 0.03 mm to 0.12 mm and a ratio W_2/W is greater than 0.35 and less than 1, where W represents a width

of each of the quartz crystal tuning fork tines, the spaced-apart distance between the first and second quartz crystal tuning fork tines being greater than or equal to the width W_2 of the at least one groove, and the step of forming the first and second quartz crystal tuning fork tines being performed after the step of forming the at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines.

34. (previously presented) A method according to claim 29; wherein each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines has a central linear portion; wherein the groove formed in each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is formed in the central linear portion of each of the first and second main surfaces of each of the first and second quartz crystal tuning fork tines so that a width of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is greater than a distance in the width direction of the at least one groove measured from an outer edge of the at least one groove to an outer edge of the corresponding one of the first and second quartz crystal tuning fork tines; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching

process, and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process, the step of forming the first and second quartz crystal tuning fork tines being performed simultaneously with the step of forming the at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines; and further comprising the steps of connecting the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the first quartz crystal tuning fork tine to the second electrodes disposed on the first and second side surfaces of the second quartz crystal tuning fork tine to form a first electrode terminal, and connecting the second electrodes disposed on the first and second side surfaces of the first quartz crystal tuning fork tine to the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the second quartz crystal tuning fork tine to form a second electrode terminal.

35. (previously presented) A method according to claim 29; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines in a first etching process so that a spaced-apart distance between the first and second quartz crystal tuning fork tines

is within a range of 0.05 mm to 0.35 mm, and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a second etching process so that a width W_2 of at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines is within a range of 0.03 mm to 0.12 mm and a ratio W_2/W is greater than 0.35 and less than 1, where W represents a width of each of the quartz crystal tuning fork tines, the spaced-apart distance between the first and second quartz crystal tuning fork tines being greater than or equal to the width W_2 of the at least one groove, and the step of forming the first and second quartz crystal tuning fork tines being performed simultaneously with the step of forming the at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines.

36. (previously presented) A method according to claim 39; wherein the quartz crystal tuning fork base has a cut portion; wherein the forming step comprises the steps of forming the first and second quartz crystal tuning fork tines and the quartz crystal tuning fork base having the cut portion in a first etching process; and forming at least one of the grooves formed in the first and second main surfaces of each of the first and second quartz crystal tuning fork tines in a

second etching process different from the first etching process; and further comprising the steps of connecting the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the first quartz crystal tuning fork tine to the second electrodes disposed on the first and second side surfaces of the second quartz crystal tuning fork tine to form a first electrode terminal; and connecting the second electrodes disposed on the first and second side surfaces of the first quartz crystal tuning fork tine to the first electrodes disposed on at least two of the stepped portions of the groove formed in each of the first and second main surfaces of the second quartz crystal tuning fork tine to form a second electrode terminal.

37. (previously presented) A method according to claim 30; further comprising the step of electrically connecting the quartz crystal tuning fork resonator to the amplification circuit and to the capacitors and the drain resistor of the feedback circuit; wherein the at least one quartz crystal oscillator comprises a quartz crystal oscillating circuit comprising a quartz crystal resonator, an amplifier, a plurality of resistors, and a plurality of capacitors, the quartz crystal resonator comprising one of a length-extensional mode quartz crystal resonator, a thickness shear mode quartz crystal resonator, a width-extensional mode

quartz crystal resonator, a Lame mode quartz crystal resonator and a SAW resonator, and a mode of vibration of the quartz crystal resonator of the quartz crystal oscillating circuit being different from that of the quartz crystal tuning fork resonator; and wherein an output signal of the quartz crystal oscillating circuit comprises a clock signal for use in operation of the electronic apparatus.